Poindexter Slough
General Meeting Notes & Responses
September 7, 2012/October 8, 2012
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Synoptic Gaging: Gain rates show no seasonality, so one consistent gain rate can be used in design. Gains are continual through the reach, at about 1 cfs per 700 ft of channel. Synoptic gaging shows average total gain of 36.1 cfs through the project reach.

Flushing Flow: Have to consider timing, magnitude, duration, and rates of change

Timing: Non-irrigation season optimal for diversion structure

Magnitude: Requires balancing flow energy with channel cross section and resulting sediment transport. The magnitude should be based on sediment transport criteria development, and the memo provides a good foundation for developing those criteria.

Recommendations:

1. Try to minimize the channel modifications in Reach 2 (10,500 ft long) to reduce costs---as such, use Reach 2 current cross section condition to define an optimal flushing flow/sediment transport relationship.

   Response:
   We agree with this recommendation and will incorporate this approach in the design

2. Revisit the flushing flow/sediment transport results shown for Reach 2 in Table 2. To do this, first revisit the "average material size transported" to reflect only riffle shear stress, not pools and riffles averaged together. See if the current conditions mobilization in Reach 2 riffles is greater than the 0.6 inch particle currently shown as mobilized.

   Response:
   We have revised the incipient motion calculations to include only riffle cross sections. The reach 2 average particle size transported at 100 cfs (flushing flow) is .87 in., ranging from .33 in. – 1.36 in. through the reach.

3. Identify the particle size that should be moved at the peak of the flushing flow to rejuvenate spawning beds. The example flushing flow of 100 cfs is estimated to mobilize a ~0.62 inch particle size in Reach 2, which is about the D50, and on the fine grained end of spawning gravels (~0.5" to 2"). That is a minimum mobilization goal, but since the D84 reaches over 4 inches, it will be necessary to have more energy during the flushing flow to work the spawning gravels. In general, it would be appropriate to set the criteria to mobilize something larger within the spawning gravel window, but well below the D84---say a 1.5 inch particle.

   Response: Please see response to Recommendation#3 following Recommendation #4

4. Identify what flushing flow would be required to move a ~1.5 inch particle in Reach 2 riffles. Finalize the sediment transport design criteria based on a realistic flushing flow volume, and mobilization of a selected particle size (something around 1.5 inches seems appropriate).

   Response to #3 and #4:
   The channel was modeled with flushing flows greater than 100 cfs to determine the flow necessary to move a 1.5" particle in Reach 2. In order to move 1 1/2" material in reach 2, a flow of roughly 300 cfs will be required.

   Though the modeling capability at this discharge is limited because the surveyed cross sections don't extend far beyond the channel banks, it is apparent that a 300 cfs discharge through Poindexter Slough would result in overbank flows through much of the channel . In addition, a new headgate structure with several gates/culverts would be required to convey this large of a flow. It is presumed that this flow would only be possible during very high water years in the Beaverhead, thus most of the headgates/culverts would be closed during "base" and "winter" flow periods.

   We need to make a decision on how large of a flushing flow is desired. If a 300 cfs flushing flow is not acceptable, what should the target particle size be? A flow of 150 cfs indicates movement of an average 1.04 in. (.45 in – 1.58 in.) particle in Reach 2. Is mobilization of a 1" particle adequate for sorting of spawning gravels? The following table provides an average and range of particle sizes moving in riffles within Reach 2 at a range of flushing flow discharges.

Fushing Flow (cfs)	Avg. Particle Size Mobilized in Reach 2 (in.)	Min. Particle Size Mobilized in Reach 2 (in.)	Max. Particle Size Mobilized in Reach 2 (in.)
100	0.87	0.33	1.36
150	1.04	0.45	1.58
200	1.19	0.54	1.77
250	1.33	0.66	1.98
300	1.44	0.73	2.14

   Please provide your input on the flushing flow discharge. It may be appropriate to provide the capacity to provide a wide range of flows, maybe up to 200 cfs, so that the flushing flow can be adaptively managed.

5. Carry those flows, along with added gains, into Reaches 3 and 4. Using Reach 2 as a transport analog, modify Reach 3 and Reach 4 cross sections to attain the same flushing flow shear stress in those Reach 3 and 4 riffles. In other words, modify the cross section to attain similar mobility at whatever flows you have during the flush (flushing flows plus gains).

   We will implement this approach once a flushing flow is selected.

6. Look carefully at Reach 1 sediment mobility at flushing flow. It is interesting that it moves a ~1 inch particle at 100 cfs, but has only ½ the gradient of Reach 2 (Table 3). Reach 1 is

channelized and narrow, so maybe this reach would benefit from some reshaping to reduce spawning gravel export rates during flushing flows. There might be some risk that flushing flows will erode banks in Reach 1 and load the system with fines downstream.

The slope downstream of XS1 in Reach, based on surveyed cross sections, is steeper than the average slope of .0013 ft/ft. The steeper slope through this section results in larger material transport capability.

7. Look at bendway shear created by the flushing flow to assess risk of major bank erosion in all reaches.

   Shear stress in the bends will be evaluated once a flushing flow and design channel cross section are determined.

Flushing Flow Duration:

The duration of the flushing flows should effectively flush fines and disturb gravels without causing major export of gravels out of the slough. I would imagine the duration would be short, on the order of several days. One way to adaptively manage the duration is to measure suspended sediment/turbity at the lower end of Poindexter Slough, to track the initial pulse of fines from the system. Once the fines concentration peaks and begins to drop, the flushing flow should taper off.

Flushing Flow Rates of Change: I would recommend that the rising limb of the flushing flow be relatively steep, to scour pools and get fines into suspension relatively quickly and to minimize overall gravel export on the rising limb. The falling limb, on the other hand, should be relatively slow to allow for sorting of the sediment into appropriate geomorphic environments such as riffle crests and bars.

Monitoring and adaptive management of the flushing flow will be critical.